

REMARKS

Claims 1-6, 12 and 14-19 are pending and presented for examination in this application. As to the amendment above to Claim 1 reciting a V-shaped groove, see, e.g., original Claim 13. The subject matter of other shapes is not disclaimed and remains presented in this application, see claim 12 and new independent claim 19. As to the amendment to Claim 1 (and Claim 12) to recite a "glass" surface, see, e.g., Applicants' specification at page 8, lines 4, 5; page 9, lines 8, 12, 14; page 10, lines 4, 6, 7-8, 15, 16, 23; page 11, lines 7, 10, 14. With regard to reciting a "glass" surface, Claim 17 has been corresponding amended, and new Claim 19 includes the recitation of a "glass" surface.

Claim 4 has been amended above, to correct a typographical error by adding a period at the end. In lines 1-3 of Claim 6, recitations which are believed to be irrelevant in this product claim have been deleted; as to the recitation added at lines 5-6 of Claim 6, see Claim 15. Claim 12 has been rewritten above, in independent form. Claim 1 having been amended above to recite the subject matter of claim 13, Claim 13 is cancelled, without prejudice. Claims 15-16 have been amended above, as to dependency.

At page 2 of the Office Action, Claims 1-4, 6, 12, 13 and 16-18 have been rejected under 35 U.S.C. 102(b) as being anticipated by Myhre (EP 0936 022).

Applicants respectfully traverse the anticipation rejection based on Myhre.

With regard to Applicants' claims 1 and 12, Myhre fails to teach or suggest "forming a V-shaped groove in a glass surface of a glass substrate" (Applicants' amended claim 1) or "forming a concave portion in a glass surface of a glass substrate" (Applicants' amended claim 12.) Myhre fails to teach or suggest a "glass surface" of a glass substrate. To the contrary, Myhre discloses a "tin oxide" surface atop glass. (Myhre, abstract; col. 3, lines 29, 32.) Myhre also fails to teach "irradiating said glass surface" as in Applicants' invention (Applicants' amended claims 1, 12.) Rather, Myhre irradiates the tin oxide layer. Thus, Applicants' method claims 1 and 12 (and method claim 17) are not anticipated by Myhre.

Additionally, the following remarks apply with regard to Applicants' claim 1, which recites a "method for machining a glass substrate" having a step of

“forming a **V-shaped groove** in a glass surface of a glass substrate”

(Applicants’ amended claim 1, emphasis added.) Myhre fails to teach or disclose a “V-shaped groove.” Myhre’s only shape taught is in his Fig. 4, which clearly is **not** a V-shape.

The Examiner’s comments at page 2 of the Office Action that:

“A beam focused at the surface of the glass results in a narrow and deep groove (narrow v-shape)” (Office Action, page 2);

“A beam focused above the surface of the glass results in a wide but shallow groove” (Id.);

“How wide and deep the groove becomes depends on the chosen combination of laser intensity, wavelength, focus, and speed” (Id.);

“With respect to the claimed conical and v-shaped grooves, this would be an inherent result between the narrow, deep groove where the beam is focused directly on the surface and the wide, shallow groove where the beam is focused far above the surface.” (Id.)

– are **not** teachings of Myhre. The present anticipation rejection of method claims based on an inherency position is not legally cognizable. As a legal matter, the present anticipation rejection should be withdrawn. At most a rejection of Applicants’ method claims under 35 U.S.C. 103(a), not 35 U.S.C. 102, would be legally cognizable.

The Examiner’s inherency theory of anticipation, in addition to failing legally (as not being proper when Myher contains so many deficiencies which the Examiner properly should expressly recognize), also fails on the facts. The Examiner appears to be improperly assuming as conventional or known, matters which were not. The Examiner has cited no reference of record teaching all of: laser-forming grooves in glass that are v-shaped grooves. Moreover, the Examiner has failed to take into account that Myher requires the use of a tin oxide protective cover layer, and that Myher is irradiating a tin oxide surface, not a glass surface. The Examiner’s inherency theory falls apart on the facts.

In sum, Myhre fails to teach or suggest a V-shaped groove, or how to form a V-shaped groove. Applicants’ method claim 1 (and, likewise, Applicants’ method claim 17) to forming a V-shaped groove are not anticipated by Myhre. Myhre’s disclosed methods yield a U-shaped hole, as his Fig. 4 shows. Applicants’ method claims reciting a v-shaped groove are not anticipated by Myhre.

Applicants have the following further distinguishing remarks with regard to their independent claim 6 which recites a “V-shaped groove laser-formed in a surface of a glass substrate, wherein an angle of from 30 degrees to 120 degrees is formed between opposite side surfaces of said V-shaped groove.” (Emphasis added.) As Applicants’ amended claim 6 recites, the inventive “V-shaped groove” has “a groove width in a range of 49-87 μm and a groove depth in a range of 19-67 μm .” Myhre fails to teach or suggest a V-shaped groove. Myhre discloses what shape he has formed, in his Fig. 4. The Myhre publication expressly shows a non-V-shaped area (Myhre Fig. 4).

Additionally, Myhre fails to teach or disclose a V-shaped groove having “an angle of from 30 degrees to 120 degrees ... between opposite side surfaces of said V-shaped groove.” (Applicants’ claim 6.)

Also, Myhre fails to teach or disclose a “V-shaped groove” that has “a groove width in a range of 49-87 μm and a groove depth in a range of 19-67 μm ,” as Applicants’ claim 6 (as amended) recites.

For these several reasons, Applicants’ independent claim 6 is not anticipated by Myhre.

As set forth above, none of Applicants’ independent claims 1, 6, 12 or 17 is anticipated by Myhre.¹ Reconsideration and withdrawal of the anticipation rejection based on Myhre are respectfully requested.

At page 3 of the Office Action, Claims 1-6 and 12-18 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Minakata et al (US 6,219,469) in view of Haight et al (US 6,333,485). The Examiner admits that “Minakata differs from the present invention in that there is no explicit description of focusing the laser above the surface of the glass, nor description of using a laser with pulse width not larger than 10 picoseconds.” (Office Action, page 3.)

Applicants respectfully traverse the obviousness rejection.

Minakata is more removed from the presently claimed invention than the Examiner has admitted. Minakata fails to teach irradiating a glass surface of a glass substrate. Minakata’s substrate is “ferroelectric.” (Minakata, col. 3, line 6;

¹For simplicity and brevity, Applicants at this time have not separately commented on further distinguishing features of their dependent claims rejected as anticipated by Myhre.

col. 4, line 62.) In Minakata, “the substrate ... is preferably made of at least one kind of single crystals selected from the group consisting of a single crystal of lithium niobate, a single crystal of lithium tantalate and a single crystal of lithium niobate-lithium tantalate solid solution.” (Minakata, col. 4, lines 7-11; see also col. 9, Example 1, line 2 (LiNbO₃ substrate).)

Applicants’ claim 1 recites a “method for machining a glass substrate”. (See also Applicants’ claim 12.) Applicants’ claim 17 recites a “method of forming a V-shaped groove in a glass surface of a glass substrate.” Applicants’ claim 6 recites a “V-shaped groove ... in a surface of a glass substrate.” A person of ordinary skill in Applicants’ art, relating to glass substrates, in the first instance would not look to Minakata, relating to a non-glass substrate. Such a person of ordinary skill in Applicants’ art has experience and a knowledge base defined by glass-related technology.² A person of ordinary skill in Applicants’ art works with glass. His focus is on the glass, and on making a specific desired shape, such as a V-shaped groove, in the glass. Conventionally, most of the V-shaped grooves in glass had been formed by chemical etching,³ and sometimes by cutting by a dicing saw.⁴ Minakata, directed to applying lasers to certain ferromagnetic substrates (which are non-glass), in the first instance is not fairly cited against Applicants’ present invention.

As for the secondary reference, Haight, how to form a V-shaped groove is not disclosed. Even with both Haight and Minakata, still elements of Applicants’ presently claimed invention are missing. Neither Minakata nor Haight teach how to obtain a V-shaped groove in a glass substrate with a glass surface. Thus, the obviousness rejection cannot stand.⁵

²See, e.g., Myhre EP 0 936 022 (cited by the Examiner in this Office Action); “LSI Handbook”, Institute of Electronics and Communication Engineers of Japan, the OHM sha Ltd. (cited at page 2, lines 15-17 of Applicants’ specification). Over 12,000 U.S. patents are found (via uspto.gov) with the word “glass” in the title (of which 237 U.S. patents mentioned “glass substrate” in the title).

³See Applicants’ specification, Background of the Invention, page 2, lines 8-9.

⁴See Applicants’ specification, Background of the Invention, page 5, lines 12+.

⁵Additionally, a person of ordinary skill in Applicants’ art would not combine Minakata and Haight in the manner that the Examiner has proposed. Haight lasers a top,

For the reasons set forth above, reconsideration and withdrawal of the obviousness rejection are respectfully requested.

In view of the foregoing, it is respectfully requested that the application be reconsidered, that claims 1-6, 12 and 14-19 be allowed, and that the application be passed to issue.

Should the Examiner find the application to be other than in condition for allowance, the Examiner is requested to contact the undersigned at the local telephone number listed below to discuss any other changes deemed necessary in a telephone or personal interview.

A provisional petition is hereby made for any extension of time necessary for the continued pendency during the life of this application. Please charge any fees for such provisional petition and any deficiencies in fees and credit any overpayment of fees to Attorney's Deposit Account No. 50-2041 (Whitham, Curtis & Christofferson, P.C.).

Respectfully submitted,



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undesirable to-be-removed component while sparing a bottom component, such as ablating chromium without affecting underlying quartz or removing an unwanted biological tumor without damaging underlying tissue. (Haight, col. 5, lines 12-15+). That Minakata does not deal with such a system of a to-be-removed top component over a to-be-spared bottom component, while Haight is specifically addressed to such a situation, shows the artificiality of how the Examiner proposes to combine Haight and Minakata. Thus, the obviousness rejection cannot stand for this further reason of the references not being combinable as the Examiner has proposed.